Postdisaster Course of Alcohol Use Disorders in Systematically Studied Survivors of 10 Disasters

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**Context:** Although several studies have suggested that alcohol use may increase after disasters, it is unclear whether any apparent postdisaster increases regularly translate into new cases of alcohol use disorders.

**Objective:** To determine the relationship of predisaster and postdisaster prevalence of alcohol use disorders and to examine the incidence of alcohol use disorders in relation to disasters.

**Design:** Data from 10 disasters, studied within the first few postdisaster months and at 1 to 3 years postdisaster, were merged and examined.

**Participants:** Six hundred ninety-seven directly exposed survivors of 10 disasters.

**Measures:** The Diagnostic Interview Schedule for DSM-III-R provided lifetime diagnoses of alcohol abuse and dependence, and onset and recency questions allowed a determination of whether the disorder had been present either prior to or following the event, or both.

**Results:** While the postdisaster prevalence of alcohol use disorders was 19%, only 0.3% of the sample developed an acute new postdisaster alcohol use disorder. Most of those in recovery, however, consumed alcohol after the disaster (83%) and coped with their emotions by drinking alcohol (22%). Those with a postdisaster alcohol use disorder were more than 4 times as likely as those without to cope with their disaster-related emotions by drinking alcohol (40% vs 9%).

**Conclusions:** The vast majority of postdisaster alcohol use disorders represented the continuation or recurrence of preexisting problems. Findings suggest that those in recovery as well as those who drink to cope with their emotions represent groups warranting potential concern for postdisaster mental health intervention. Further research is needed to clarify the clinical significance of changes in alcohol use after disasters.


The stress-reduction model of alcoholism regards alcohol consumption as a palliative coping mechanism for emotional stress that leads to problem drinking.1-7 Trauma is a distinct subtype of stress that involves physical danger.8 The association between alcohol use disorders and both trauma exposure and posttraumatic stress disorder (PTSD) has been well documented in various populations.9-17 Following the stress-reduction model of alcoholism, it is widely believed that increased or excessive use of alcohol after trauma may represent “self-medication” of posttraumatic emotional distress.17,23 The causal pathways defining relationships between trauma and alcohol use disorders may include various possibilities such as vulnerability to problem drinking in response to trauma exposure, emotional distress arising from excessive drinking, and a variety of shared vulnerability factors that are common to both PTSD and alcohol use disorders.17,24,25 Another potential pathway in the association between trauma and alcoholism is excessive risk for trauma exposure among individuals with substance use disorders, creating potential for sampling selection bias in studies of trauma and these disorders. Psycho-pathology, and specifically substance abuse/dependence, is well documented in association with risk of exposure to life-time trauma.11,20-28 The study of disasters that befall general populations—and are thus relatively unrelated to preexisting vulnerabilities of those affected—provides unusual opportunities to investigate the relationship between trauma and alcohol use disorders.28,30 It is well established that disasters can have significant mental health consequences, especially among the most highly exposed survivors of severe incidents.30-33
A remarkable high prevalence of postdisaster problem drinking or alcohol use disorders has been identified in some populations, eg, Hurricane Katrina survivors, firefighters serving as rescue workers after the Oklahoma City bombing, and Midwestern flood survivors. In such studies, postdisaster alcohol use disorder prevalence information alone may generate more questions than it answers about the relationship between disaster exposure and alcohol use disorders. Understanding causal pathways in relationships between disasters and alcohol use disorders requires the differentiation of psychiatric disorders that began before the disaster from all disorders observed after the disaster: that is, it is necessary to distinguish new from preexisting cases.

A number of studies have examined changes in alcohol consumption patterns following disasters. Postdisaster increases in alcohol use compared with predisaster levels of consumption have been reported in various disaster studies, including various populations affected by the September 11, 2001, attacks. Norris and colleagues noted that escalation of alcohol use after disasters may be most apparent among individuals who already manifested drinking problems before the disaster. Other studies, however, have found little or no increase in alcohol consumption after disasters.

The clinical significance of increased use of alcohol after disasters has not been established. Not all alcohol consumption is necessarily pathological. That is, not everyone who drinks alcohol has an alcohol use disorder; indeed, most people who drink do not. This undoubtedly holds true even if a general increase in drinking is observed after a disaster. Alcohol consumption patterns thus need to be understood not only as pathological drinking behaviors of distressed people but also as social drinking. For example, social drinking may increase among groups of people who are temporarily unable to work or are unemployed after their workplace has been destroyed. Alternatively, declines of alcohol sales following disasters may be a function of other intervening variables such as economic downturns that reduce disposable income within the financially distressed population affected. In contrast, a diagnosis of alcohol use disorder provides a measure of pathological drinking that is not captured by the heterogeneous data representing alcohol consumption patterns.

The question of whether disasters precipitate the onset of new alcohol problems among people without a history of such problems has not received sufficient study, and conclusions related to this topic remain ambiguous. The purpose of this article was to present findings from an analysis of a large database of survivors of several different disasters studied with consistent methods to examine the relationship of the predisaster and postdisaster prevalence of alcohol use disorders and to determine the postdisaster incidence of alcohol use disorders.

A series of 10 disaster studies was included in this analysis: 4 mass murder episodes, floods, a tornado, an earthquake, a firestorm, a plane crash into a hotel, and the Oklahoma City terrorist bombing. Initial (ie, index) interviews were completed between 1 and 6 months after the disasters. For 3 disasters, the last follow-up was 1 year postdisaster, and for the remainder, the last follow-up was at 3 years. Table 1 summarizes the characteristics of each of the 10 disasters included in this report, numbers of directly exposed participants in each site, and the timing of interviews relative to the disaster. Four of the 10 disaster studies used volunteer samples. Among the remaining 6 sites, the participation rate among those eligible was 77%. The index sample included 811 directly exposed participants. The follow-up assessment completion rate of the index sample was 88%, but only 86% provided complete predisaster and postdisaster alcohol data (N = 697). The last follow-up was at 1 year for 400 individuals and at 3 years for 297 individuals. The mean number of months from the date of the disaster to the index interviews was 3.4 (SD, 2.2; median, 3; range, 1-12) and to follow-up was 26.1 (SD, 11.1; median, 19; range, 11-48).

This report describes findings for the 697 individuals with complete index and follow-up predisaster and postdisaster alcohol diagnosis data. The sample was 57% female and predominantly (92%) white and included 6% African American individuals and 2% other races. Respondents' mean age at the time of the disaster was 46.0 years, and 28% were between the ages of 18 and 35 years. Mean number of years of education was 13.9 (SD, 2.3; median, 14; range, 4-17), and 36% were college graduates. Most (74%) were married; 14% were divorced or separated, and 12% were single. More than one-third (38%) were injured in the disaster and 20% were diagnosed with disaster-related PTSD at index.

The group with complete index and follow-up data did not differ from those who were either lost to follow-up or had missing data in terms of sex, racial/ethnic group membership, injury in the disaster, or index diagnoses of PTSD or alcohol use disorders. More married than unmarried people (83% vs 76%; $P = .001$) and more of those with than without a college degree (83% vs 76%; $P = .02$) had complete index and follow-up data. Additionally, participant age was positively associated with complete index and follow-up data (for years of age, mean [SD], 46.0 [14.3] vs 41.1 [16.3]; $t_{120} = 3.69; P < .001$).

The Diagnostic Interview Schedule (DIS) for DSM-III-R provided lifetime diagnoses of alcohol abuse and dependence, and onset and recency questions allowed a determination of whether the disorder had been present either prior to or following the event, or both. Diagnostic scoring for the DIS defines recovery from alcohol abuse or dependence as reporting no current symptoms among those meeting lifetime criteria. Therefore, for this study, recovery from predisaster alcohol use disorder represents people with a predisaster disorder who reported no alcohol symptom criteria after the disaster. Because the DIS did not provide information about the status of the disorder immediately before the event in individuals with a predisaster alcohol use disorder, it was not possible to differentiate postdisaster alcoholic relapse among those in recovery at the time of the disaster from the continuation of preexisting problem drinking. The DIS yielded variables representing the 9 potential DSM-III-R criteria for alcohol dependence and their sum that provided a count of symptom criteria. The Disaster Supplement to the DIS also provided data on disaster exposure and other variables of relevance to the disaster experience. The consistency of instruments and general research protocols across all 10 disaster studies allowed data to be merged from all 10 disaster studies into a single consistent database.
Table 1. Description of 10 Disaster Studies and Directly Exposed Samples in Merged Disaster Survivor Database

<table>
<thead>
<tr>
<th>Disaster, Date</th>
<th>Disaster Description/Study Sample</th>
<th>Months From Event to Index Assessment</th>
<th>Months From Event to Follow-up</th>
<th>Index Sample Size</th>
<th>Follow-up With Complete Data, No. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indianapolis, Indiana, hotel-plane crash, 10/20/87</td>
<td>Air force jet fighter crashed into lobby of the airport Ramada Inn, causing 10 fatalities (8 employees and 1 patron). The damaged hotel was closed and later demolished, and most surviving employees lost employment. Index sample: 74% of all hotel employees.</td>
<td>1</td>
<td>45</td>
<td>17</td>
<td>14 (82)</td>
</tr>
<tr>
<td>Russellville, Arkansas, businesses shooting rampage, 12/28/87</td>
<td>47-Year-old man murdered 14 people in his rural mobile home outside Dover, Arkansas, and then went on a 35-min shooting spree across town, killing 2 more people and injuring 4 in several area businesses. Index sample: 72% of employees of 2 affected businesses.</td>
<td>1</td>
<td>45</td>
<td>11</td>
<td>10 (91)</td>
</tr>
<tr>
<td>Madison, Florida, tornado, 4/19/88</td>
<td>At 4:35 am, an F-4 tornado moved a mile-wide path through town with no warning, causing 4 fatalities and 17 injuries. Index sample: 89% of affected households (1 representative member).</td>
<td>1</td>
<td>41</td>
<td>40</td>
<td>37 (93)</td>
</tr>
<tr>
<td>Killeen, Texas, cafeteria shooting rampage, 10/16/91</td>
<td>Gunman drove his truck through the front window of Luby's Cafeteria and then held 150 patrons and employees captive while systematically shooting people over 15 min, causing 24 fatalities (including the gunman) and 20 injuries. Index sample: 82% of all people in the restaurant during the shooting.</td>
<td>2</td>
<td>37</td>
<td>123</td>
<td>115 (93)</td>
</tr>
<tr>
<td>Northridge, California, earthquake, 1/17/94</td>
<td>Earthquake measuring 6.7 on Richter scale occurred in Northridge. It produced the most severe ground motions ever recorded in a North American city. There were 72 fatalities and 1500 serious injuries. Volunteer sample from study invitation randomly mailed to households in affected areas (1 representative member each).</td>
<td>3</td>
<td>15</td>
<td>127</td>
<td>112 (88)</td>
</tr>
<tr>
<td>Clayton, Missouri, courthouse shooting rampage, 6/5/92</td>
<td>Estranged husband with guns in courthouse shot wife and both parties’ lawyers, shot at judge, and stalked hallways with guns for 10 min, causing 1 fatality (gunman’s wife) and 5 injuries. Volunteer sample of courthouse employees, lawyers, judges, and law enforcement.</td>
<td>2</td>
<td>37</td>
<td>79</td>
<td>74 (94)</td>
</tr>
<tr>
<td>Oklahoma City, Oklahoma, federal building bombing, 4/19/95</td>
<td>Domestic terrorist bombing of Alfred P. Murrah Federal Building with 167 fatalities (including 19 children) and 684 injuries. Most severe act of terrorism ever on American soil at that time. Index sample: 71% of every fifth person on health department registry.</td>
<td>6</td>
<td>17</td>
<td>182</td>
<td>137 (75)</td>
</tr>
<tr>
<td>St Louis, Missouri, area floods, 4/15/93</td>
<td>Melting snow and heavy rains flooded the Mississippi River and its tributaries over 9 states. Much of the St Louis area was covered with water for months with 5 separate flood crests. Raging floodwaters crushed area levees, flooding 5000 homes and claiming nearly 25 lives and costing $3 billion. Volunteer sample of respondents to study invitation randomly mailed to flood area households (1 representative member each).</td>
<td>4</td>
<td>17</td>
<td>162</td>
<td>137 (85)</td>
</tr>
<tr>
<td>Iowa City, Iowa, university shooting rampage, 11/2/91</td>
<td>A disgruntled graduate student went on a shooting rampage beginning in the Physics Building of a major university and leaving 6 university professors, students, and staff dead and 1 seriously injured as he made his way across campus. He ended the rampage when he shot himself fatally. Index sample: 77% of universe of individuals determined to be in the areas where the gunman was in the physics building.</td>
<td>1</td>
<td>37</td>
<td>9</td>
<td>7 (78)</td>
</tr>
<tr>
<td>Oakland/Berkeley, California, firestorm, 10/20/91</td>
<td>After a 5-year drought, a massive firestorm was spread rapidly by strong Santa Ana winds that destroyed nearly 3000 homes over 3 d, costing $1.5 billion. It affected neighborhoods in the Oakland hills that were largely upscale and an older population including many retirees. The rapidly advancing firestorm killed 25 people and injured another 150. Volunteer sample of respondents to study invitation randomly mailed to burned area households (1 representative member).</td>
<td>4</td>
<td>39</td>
<td>61</td>
<td>54 (89)</td>
</tr>
</tbody>
</table>

Total (10 disasters)                                                                 Mean (SD), 3.4 (2.2) | Mean (SD), 26.1 (11.1) | 811 | 697 (86)
alcohol use disorders were in remission and only 2 new postdisaster cases of alcohol abuse or dependence were observed. At index, only 2 individuals (0.4% of 526 without predisaster alcohol abuse/dependence and 0.3% of all 697 survivors) developed new (incident) postdisaster alcohol abuse/dependence. At last follow-up, the postdisaster prevalence of alcohol abuse/dependence during the interval since index was 14%.

Of 567 individuals without postdisaster alcohol abuse/dependence at index, 20 (3%) developed alcohol abuse/dependence during the follow-up period. Eight of these 20 cases represented relapse from predisaster alcohol abuse/dependence during the follow-up interval, and the other 12 constituted new abuse/dependence cases with no lifetime history of alcohol use disorder, reflecting a 2% incidence of postdisaster alcohol abuse/dependence among 524 individuals with no lifetime history of alcohol use disorder at the index interview. Another 80 active alcohol abuse/dependence cases in the follow-up period represented continuing predisaster alcohol abuse/dependence from index. One of the 2 cases with incident alcohol abuse/dependence at index was among them. Finally, 50 cases with alcohol abuse/dependence at index were in remission during the follow-up period. Of these cases, 49 predated the disaster, and the remaining constituted 1 of the 2 incident alcohol abuse/dependence cases at index. The rate of onset of new alcohol use disorders over the next 2 years (0.08 new case per month over a mean of 26.1 months) was not different from the postdisaster rate of onset of new alcohol use disorders at index (ie, 0.08 new case per month over a mean of 3.4 months).

At index, the mean number of lifetime predisaster alcohol abuse symptom criteria was 0.7 (SD, 1.3) and the mean number of postdisaster symptom criteria was 0.2 (SD, 0.7). Respondents with a predisaster diagnosis of alcohol abuse/dependence were much more likely to experience new onset of alcohol use disorders during the follow-up period than those who did not have a predisaster diagnosis (524/567) versus (43/567) (P < .001).

Table 2. Demographics at Index and Alcohol Use Disorder Prevalence in Predisaster, Index Postdisaster, and Follow-up Time Frames, by Disaster Site

<table>
<thead>
<tr>
<th>Disaster</th>
<th>Male, No./ Total No. (%)</th>
<th>Age at Index, y, Mean (SD) [Range]</th>
<th>Lifetime Predisaster</th>
<th>Postdisaster at Index</th>
<th>Postdisaster at Last Follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indianapolis, Indiana, hotel-plane crash</td>
<td>5/14 (35.7)</td>
<td>30.2 (8.9) [19-52]</td>
<td>7/14 (50.0)</td>
<td>7/14 (50.0)</td>
<td>7/14 (50.0)</td>
</tr>
<tr>
<td>Russellville, Arkansas, businesses shooting rampage</td>
<td>4/10 (40.0)</td>
<td>34.2 (6.6) [23-43]</td>
<td>2/10 (20.0)</td>
<td>1/10 (10.0)</td>
<td>1/10 (10.0)</td>
</tr>
<tr>
<td>Madison, Florida, tornado</td>
<td>15/57 (40.5)</td>
<td>43.6 (10.8) [25-70]</td>
<td>4/37 (10.8)</td>
<td>3/37 (8.1)</td>
<td>3/37 (8.1)</td>
</tr>
<tr>
<td>Killeen, Texas, cafeteria shooting rampage</td>
<td>57/115 (49.6)</td>
<td>39.7 (14.1) [18-83]</td>
<td>38/115 (33.0)</td>
<td>28/115 (24.4)</td>
<td>33/115 (28.7)</td>
</tr>
<tr>
<td>Northridge, California, earthquake</td>
<td>58/112 (51.8)</td>
<td>54.4 (14.7) [21-81]</td>
<td>21/112 (18.8)</td>
<td>18/112 (14.3)</td>
<td>18/112 (16.1)</td>
</tr>
<tr>
<td>Clayton, Missouri, courthouse shooting rampage</td>
<td>26/74 (35.1)</td>
<td>39.0 (11.2) [18-62]</td>
<td>24/74 (32.4)</td>
<td>19/74 (25.7)</td>
<td>21/74 (28.4)</td>
</tr>
<tr>
<td>Oklahoma City, Oklahoma, federal building bombing</td>
<td>67/137 (48.9)</td>
<td>43.1 (10.5) [20-89]</td>
<td>33/137 (24.1)</td>
<td>22/137 (16.1)</td>
<td>29/137 (21.2)</td>
</tr>
<tr>
<td>St Louis, Missouri, area floods</td>
<td>45/137 (32.9)</td>
<td>48.8 (14.1) [24-81]</td>
<td>31/137 (22.6)</td>
<td>11/137 (8.0)</td>
<td>28/137 (20.4)</td>
</tr>
<tr>
<td>Iowa City, Iowa, university shooting rampage</td>
<td>67/137 (48.9)</td>
<td>39.6 (14.7) [26-62]</td>
<td>27/137 (20.1)</td>
<td>27/137 (20.1)</td>
<td>28/137 (20.4)</td>
</tr>
<tr>
<td>Oakland/Berkeley, California, firestorm</td>
<td>15/54 (27.8)</td>
<td>57.5 (12.6) [34-82]</td>
<td>9/54 (16.7)</td>
<td>7/54 (13.0)</td>
<td>9/54 (16.7)</td>
</tr>
<tr>
<td>Total (10 disasters)</td>
<td>298/697 (42.8)</td>
<td>46.0 (14.5) [18-89]</td>
<td>171/697 (24.5)</td>
<td>130/697 (19.0)</td>
<td>150/697 (21.5)</td>
</tr>
</tbody>
</table>

Figure 1. Alcohol use disorders in time frames of predisaster lifetime prevalence, postdisaster prevalence at index, and new (incident) cases since index at last follow-up (F/U).

Symptom onset and recency variables in the data allowed differentiation of predisaster and postdisaster prevalence and incidence of alcohol abuse and dependence symptoms and diagnoses. Descriptive data are presented with raw numbers, proportions, means, standard deviations, and, where appropriate, ranges and median values. Categorical variables were compared using x² tests, substituting Fisher exact tests for expected cell sizes of fewer than 5 observations, and using 2-sided tests of probability. Dichotomous and continuous variables were compared with t tests, using Satterthwaite analysis for situations of unequal variance. Statistical significance level was set at α = .05. In comparison of alcohol use disorders across disaster sites, multiple logistic regression analyses were conducted by sex, all of which controlled for age.

RESULTS

ALCOHOL USE DISORDERS AND SYMPTOM CRITERIA

Table 2 provides sex and age at index and alcohol use disorder prevalence in predisaster, index postdisaster, and follow-up assessment time frame, by disaster site. The predisaster lifetime prevalence of alcohol use disorder was 25% (alcohol abuse in 10% and alcohol dependence in 15%). The postdisaster prevalence of alcohol use disorder at index was 10% (alcohol abuse in 6% and alcohol dependence in 13%). Figure 1 documents cases of alcohol use disorders in the 3 time frames of predisaster lifetime prevalence, postdisaster prevalence at index, and new (incident) cases since index at last follow-up. At postdisaster index, 25% of respondents with predisaster alcohol use disorders were in remission and only 2 new postdisaster cases of alcohol abuse or dependence were observed. At index, only 2 individuals (0.4% of 526 without predisaster alcohol abuse/dependence and 0.3% of all 697 survivors) developed new (incident) postdisaster alcohol abuse/dependence. At last follow-up, the postdisaster prevalence of alcohol abuse/dependence during the interval since index was 14%.

Of 567 individuals without postdisaster alcohol abuse/dependence at index, 20 (3%) developed alcohol abuse/dependence during the follow-up period. Eight of these 20 cases represented relapse from predisaster alcohol abuse/dependence during the follow-up interval, and the other 12 constituted new abuse/dependence cases with no lifetime history of alcohol use disorder, reflecting a 2% incidence of postdisaster alcohol abuse/dependence among 524 individuals with no lifetime history of alcohol use disorder at the index interview. Another 80 active alcohol abuse/dependence cases in the follow-up period represented continuing predisaster alcohol abuse/dependence from index. One of the 2 cases with incident alcohol abuse/dependence at index was among them. Finally, 50 cases with alcohol abuse/dependence at index were in remission during the follow-up period. Of these cases, 49 predated the disaster, and the remaining constituted 1 of the 2 incident alcohol abuse/dependence cases at index. The rate of onset of new alcohol use disorders over the next 2 years (0.08 new case per month over a mean of 26.1 months) was not different from the postdisaster rate of onset of new alcohol use disorders at index (ie, 0.08 new case per month over a mean of 3.4 months).

At index, the mean number of lifetime predisaster alcohol abuse symptom criteria was 0.7 (SD, 1.3) and the mean number of postdisaster symptom criteria was 0.2 (SD, 0.7). Respondents with a predisaster diagnosis of alcohol abuse/dependence were much more likely to experience new onset of alcohol use disorders during the follow-up period than those who did not have a predisaster diagnosis (524/567) versus (43/567) (P < .001).
dependence acknowledged a higher number of postdisaster alcohol symptom criteria than those without (mean [SD], 1.1 [1.2] vs 0.1 [0.3]; \( t_{177.02} = 10.8; P < .001 \)).

Figure 2 shows the predisaster prevalence (the black sections of the bars), postdisaster incidence at index (the dark gray bands), and incidence during the follow-up period (the light gray bands) for each DSM-III-R alcohol symptom criterion. The most prevalent symptom criterion reported was the one involving drinking interfering with role obligations or physically hazardous drinking (such as drinking and driving), and the least common symptom criterion was alcohol withdrawal (eg, shaking, delirium tremens, or seizures). At index, 29% acknowledged 1 or more predisaster alcohol symptom criteria and 23% reported at least 1 postdisaster alcohol symptom criterion. Only 2% described any new (incident) postdisaster symptom criteria at index, and at follow-up, 6% with no lifetime history of alcohol symptom criteria acknowledged at least 1 additional incident symptom criterion. Among 171 survivors with predisaster alcohol abuse/dependence, the 43 in recovery at index had significantly fewer predisaster symptom criteria than did the 128 with continuing alcohol abuse/dependence (mean [SD], 2.2 [1.3] vs 3.4 [2.2]; \( t_{117.93} = 4.30; P < .001 \)).

PREDICTORS OF ALCOHOL USE DISORDERS

More men than women met criteria for predisaster (39% vs 14%; \( \chi^2 = 55.56; P < .001 \)) and postdisaster (29% vs 11%; \( \chi^2 = 28.14; P < .001 \)) alcohol abuse/dependence at index. Those with an index alcohol abuse/dependence diagnosis were significantly younger than those without (mean [SD], 41.4 [13.7] years vs 47.5 [14.4] years; \( t_{695} = 4.82; P < .001 \)). Those who were unmarried had a significantly higher prevalence of alcohol use disorder both before (20% vs 37%; \( \chi^2 = 20.84; P < .001 \)) and after (14% vs 31%; \( \chi^2 = 25.04; P < .001 \)) the disaster. There was no association between either index predisaster and postdisaster alcohol use disorders and minority group membership, level of education, or injury during the disaster.

Controlling for age in multiple logistic regression models, the postdisaster prevalence of alcohol abuse/dependence was higher among male survivors of the St Louis, Missouri, floods (44% vs 26%; \( \beta = 1.04; SE = 0.35; \chi^2 = 8.85; P = .003 \); odds ratio, 2.84; 95% confidence limits, 1.43, 5.64) than among male survivors of all other sites combined. In a similar model, the predisaster prevalence of alcohol abuse/dependence was higher among male survivors of the Clayton, Missouri, courthouse shootings (62% vs 31%; \( \beta = 0.95; SE = 0.43; \chi^2 = 4.97; P = .03 \); odds ratio, 2.58; 95% confidence limits, 0.43, 4.97) than among male survivors of other sites combined.

Compared with those without a postdisaster alcohol use disorder, those with a disorder experienced a significantly higher prevalence of disaster-related PTSD (28% vs 18%; \( \chi^2 = 7.85; P = .005 \)) and postdisaster major depression (18% vs 12%; \( \chi^2 = 3.83; P = .05 \)), but not predisaster major depression. Posttraumatic stress disorder symptom group C was associated with predisaster alcohol abuse/dependence (31% vs 21% of those with vs without alcohol abuse/dependence meeting group C criteria; \( \chi^2 = 29.52; P = .02 \)), but PTSD symptom groups B and D were not associated with postdisaster alcohol abuse/dependence. Among those with a predisaster alcohol use disorder, the presence of a postdisaster alcohol use disorder (ie, relapse or continued alcohol problems) was not associated with the development of disaster-related PTSD (29% vs 23% of those with and without PTSD, respectively, meeting criteria for a postdisaster alcohol use disorder; \( \chi^2 = 0.52; P = .47 \)).

ALCOHOL CONSUMPTION, DRINKING TO COPE, AND TREATMENT

At index, 66% of the sample (of only 620 respondents, because 77 lacked consumption recency data) reported consuming any alcohol since the disaster, but only 16% of the sample (representing 27% of those who had consumed any alcohol after the disaster) said they coped with the disaster by drinking. More of those who reported that they coped with their feelings by using alcohol than those who did not had a postdisaster alcohol use disorder at index (40% vs 10%; \( \chi^2 = 64.16; P < .001 \)). At index, 83% of individuals with a predisaster alcohol use disorder who were in recovery since the disaster had consumed alcohol after the disaster, a rate that did not differ from the 83% among those with continued alcohol abuse/dependence. These rates were significantly greater, however, than the 60% of those with no lifetime history of alcohol use disorder (\( \chi^2 = 8.14; P = .004 \)). Among the survivors with a predisaster alcohol use disorder, 22% of those in recovery said they drank alcohol to cope with their feelings about the disaster. This figure was significantly less than the 40% among those with active alcohol abuse/dependence after the disaster (\( \chi^2 = 4.17; P = .04 \)) but significantly greater than 9% among those without predisaster alcohol use disorder (Fisher exact \( P = .03 \)).

Of those with a predisaster alcohol use disorder, only 11% had received alcohol treatment before the disaster.
This analysis of combined data from 10 disasters studied with consistent methods revealed a 19% postdisaster prevalence of alcohol use disorders, but only 0.3% of the sample developed a new (incident) postdisaster alcohol use disorder in the first few months after the disaster. Consistent with this study’s findings regarding alcohol abuse/dependence, few new (ie, incident) symptom criteria were observed at index or follow-up. Thus, the vast majority of postdisaster alcohol use problems represented a continuation or recurrence of preexisting problems. The rate of development of new (incident) cases did not change between index and follow-up. These findings suggest that the course of alcohol problems observed in this study may reflect more of the natural history of alcoholism than findings specific to the disaster setting itself.

Despite evidence from other studies that alcohol use may increase after disasters, the findings from this study suggest that this increase in use may not regularly translate into new onset of postdisaster alcohol use disorders. Causal relationships between disaster exposure and alcohol use disorders are not easily demonstrated from descriptive studies such as this one. The finding, however, that new alcohol use disorders were rare in this large sample of highly exposed disaster survivors argues against a hypothesis that alcoholism is caused by self-medication in response to emotional distress, as suggested by the stress-reduction model of alcoholism.

Consistent with these findings, other studies of disaster survivors that have used structured interviews to assess full diagnostic criteria have generally failed to find new onset of alcohol use disorders in association with disaster exposure.37,31-35 One contrary finding was reported from a random-digit dial telephone survey of Manhattan, New York, residents (most of whom were not directly exposed to the September 11 attacks) conducted 1 year after the attacks, in which proximity to the disaster was associated with alcohol dependence.18 In that study, however, alcohol dependence was determined from 4 questions about alcohol that did not assess criteria for this diagnosis, and incidence of alcohol problems was not differentiated from their prevalence after the disaster. Further research is needed to clarify the significance of changes in alcohol use after disasters, by collecting and comparing detailed data on alcohol consumption and diagnostic data on alcohol use disorders in the same study.

The diagnostic instrument (the DIS) used to assess psychiatric disorders in the disaster database analyzed for this article was originally designed to determine lifetime and current psychiatric disorders in general populations. Because the DIS obtained first onset and most recent occurrence of individual alcohol symptom criteria, both predisaster and postdisaster occurrence could be specified, and incidence could be differentiated from prevalence. The DIS was not designed to determine the immediate predisaster status of psychiatric disorders and symptoms, however. Without assessment of this status, it cannot be determined from the available data how many of the 25% of the sample with a predisaster alcohol use disorder were in remission at the time of the disaster, and thus postdisaster cases of alcoholic relapse cannot be differentiated from continuing alcohol abuse/dependence. The group with postdisaster alcohol use disorders in the current study likely includes some respondents whose alcoholism became more severe after the disaster as well as some who were in recovery at the time of the disaster and then relapsed.

Because information on the status of alcohol use disorders in the immediate predisaster period is needed to differentiate postdisaster relapse following previously remitted disorders from continuing active alcohol problems in the postdisaster setting, future research on the relationship of alcohol use disorders to disaster exposure would benefit by securing data on respondents’ alcohol use disorder status in the immediate predisaster period. The distinction between alcoholic relapse and continuing or new alcohol problems is important, because people who are in recovery from alcoholism when a disaster strikes may be especially vulnerable to relapse when exposed to highly stressful events,2 thus constituting a population deserving of particular attention in the postdisaster period.

In this study, people with a predisaster alcohol use disorder who were in recovery since the disaster were of concern, because 83% consumed alcohol after the disaster and 22% coped with their emotions by drinking. Few people who did not use alcohol to cope after the disaster had a postdisaster alcohol use disorder (9%), compared with 40% of those who said they coped by drinking. These findings suggest that those who use alcohol to cope with a disaster may constitute an appropriate group to target for alcohol interventions. Those in recovery who drink after exposure to disaster may also be at risk for postdisaster alcohol problems. The finding that postdisaster alcohol problems among those with a predisaster alcohol use disorder were not associated with the development of PTSD whereas alcohol use disorders in the total sample were associated with PTSD may suggest that drinking perception may not be associated with PTSD, but instead some unmeasured factor that is more generally associated with vulnerability to alcohol use disorders, such as preexisting personality.

A major strength of this study is the methodological consistency with which the same research team assessed psychiatric disorders among survivors of 10 disparate disasters. Another strength is the high participation rates among participants and relatively small attrition bias in follow-up studies. Lack of data on respondents’ immediate predisaster status of alcohol use disorders that precluded identification of postdisaster relapse was previously mentioned as a limitation, and a related limitation is the lack of data obtained on the amount of alcohol use to differentiate an isolated and temporary “slip” from a return to substantial alcohol consumption. Other
limitations were the variable timing of assessment of interviews at index and follow-up, sample attrition, and potential recall bias of predisaster data obtained in the early postdisaster period. Although the St Louis area flood sample may have been confounded with vulnerability to flooding and alcohol use disorders associated with respondents’ choice to live on a flood plain, the findings in that sample did not differ from those of the other groups.

Another limitation of this study’s design was the lack of an unexposed group with which to compare the rates of alcohol use disorders and their characteristics. A comparison group of individuals not exposed to disasters would have helped to interpret the postdisaster alcoholic relapse and ongoing drinking behaviors of disaster survivors with the course over 1 to 3 years of alcohol problems within general populations who experience such problems. Future studies should provide a comparison group of this nature. The prevalence of continuing problems with alcohol in disaster survivors with preexisting alcohol problems is not inconsistent, however, with the known chronicity and potential for relapse of people with the disease of alcoholism. Further, the very low incidence of new alcohol use disorders and symptoms found in the disaster-exposed survivors in this study stands by itself: new alcohol use disorders and symptoms do not appear to regularly follow disaster exposure.

This sample, predominantly white, may not reflect findings in other postdisaster populations of other ethnic minorities. Although previous work by this research team comparing predominantly white survivors of the Oklahoma City bombing with African survivors of the bombing of the US Embassy in Nairobi, Kenya, found psychiatric similarities across the 2 groups, coping responses varied greatly between the groups.60 Our previous research on evacuees from Hurricane Katrina, a sample that was three-fourths African American, found significant problems in this population that were related to socioeconomic deprivation and preexisting chronic psychiatric illness, in contrast to the findings from the predominately white data set in this study.37 Further research is needed to examine similarities and differences in experience of the same disasters across ethnic groups.

Additional research examining the course of alcohol use disorders is needed to confirm this study’s findings that the vast majority of postdisaster alcohol use disorders are indeed preexisting. In particular, further research is needed to determine whether those in recovery from preexisting alcohol use disorders relapse after disasters and whether those with ongoing alcohol problems tend to experience increased alcohol problems following disaster exposure, which would require the collection of data on alcohol use problems in the immediate predisaster period. The preexisting nature of most postdisaster alcohol problems identified in this study would suggest that efforts to identify alcohol problems after disasters should focus on those with preexisting problems, i.e., those in apparent recovery as well as those with continuing alcohol use disorders in the postdisaster period. Regardless of the predisaster history of alcohol use disorders among disaster-exposed populations, assessment of distressed populations in the postdisaster period can provide opportunities for those with identified alcohol problems to obtain treatment.

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